

Psychological Bulletin

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PUBLISHED MONTHLY BY THE

PSYCHOLOGICAL REVIEW COMPANY

41 NORTH QUEEN ST., LANCASTER, PA.,

AND PRINCETON, N. J.

AGENTS: G. E. STECHERT & CO., LONDON (2 Star Yard, Carey St., W. C.); PARIS (16, rue de Condé)

Entered as second-class matter January 21, 1904, at the post-office at Lancaster, Pa., under Act of Congress of March 3, 1879

Psychological Review Publications

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Lancaster, Pa. and Princeton, N. J.

FOREIGN AGENTS: G. E. STECHERT & CO., London (2 Star Yard, Cary St., W.C.)
PARIS (16, rue de Condé)

THE
PSYCHOLOGICAL BULLETIN

GENERAL REVIEWS AND SUMMARIES

VISUAL SPACE

BY MABEL C. WILLIAMS

University of Iowa

Under a somewhat misleading title Koffka (4) has brought together a series of articles which had previously appeared in the *Zsch. f. Psychol.* Mention of the subjects of the several articles in this compilation is warranted by the general interest. Kenkel discusses the connection between apparent size and apparent movement. Korte (deceased) reports some investigations of problems connected with the cinematoscope. Koffka discusses the foundations of a psychology of perception which is chiefly an explanation of Benussi's theories. Koffka also presents an attempt at a physiological-mathematical theory of the perception of movement.

Henning (2) defines the content of his article in its title. The novel part of the research is the explanation of the apparent increase in size of the setting and rising sun (and moon) in terms of the clearer definition of objects illuminated by the longer light waves which predominate at such times. Being clearly and more distinctly seen the sun appears to be nearer and therefore larger. The change in apparent size occurs in other objects as well. There are many other factors entering into the illusion and the author enumerates and discusses these and refers some of them to the laws referred to in the title. Some experimental evidence, chiefly qualitative, is given.

Meyer (5) presents a continuation of previous research published some years ago (*Zsch. f. Psychol.*, 1913, 64, pp. 66 ff.), on the memory for spatial position for certain oddly shaped figures. In the present research the same figures are presented in different

positions of rotation toward left, right, backward, and forward. After twenty-four hours' interval the observers were required to identify the position in which any given figure was presented. Various tendencies to error are noticed, especially the identification of neighboring and symmetrical positions with the original, and inability to determine the degree of rotation through the direction was correctly given.

Wingender (6) studied a series of well known geometrical figures presented under unique conditions of illumination. The main or base line or lines of such figures as the Hering, Müller-Lyer, Zöllner, were rendered visible through reflected light, the accessory lines through transmitted light. The whole figure was visible with simultaneous illumination from both sources. Alternating the two types of illumination produced marked changes in the figures, some of which became very elastic. The "critical frequency," the rate of alternation in illumination which brings about constant unrest, was determined for the various figures and different observers. Similar procedure was followed in the study of proportion and stereoscopic forms.

Kaila (3) does not attempt a complete empirical explanation of the perception of depth through disparity: rather he discusses depth localization through double images on the basis of an acquired "association mechanism." The author devotes considerable space to a critical review of the theories of various writers on depth perception and illustrates his own theory of how the association mechanism is built up in the child with the result that definite ideas of depth are associated with the stimulation of all correspondingly paired retinal points.

Enjalran (1) in a long historical, descriptive, and critical article, does not attach so much significance to the part played by corresponding retinal points in perception of depth as is customary. His theory of visible relief is based upon the apparent oblique directions of lines and surfaces in the object seen. He does, however, lay considerable stress upon the significance of retinal disparity.

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SPACE ILLUSIONS

BY EDWARD S. ROBINSON

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In a paper of philosophical rather than psychological interest Pratt (1) takes Professor Spaulding to task for the latter's discussion of illusions, hallucinations, and dreams in his book, *The New Rationalism*. According to the critic, Professor Spaulding states that existents are of two kinds, physical and mental. He also states that illusory and hallucinatory objects do not exist and that they never have existed. They simply subsist. Pratt doubts the validity of Spaulding's attempt to reconcile these two statements by showing that, whereas normal mental entities are existents, hallucinatory ones are non-existents. According to Pratt, if dreams and hallucinations, dream objects and hallucinatory objects, do not exist, then no psychical entities exist.

Wingender (2) studied various geometrical-optical illusions, including the Hering, Zöllner and Müller-Lyer figures. The apparatus was so arranged that the main or illusory lines of each figure could be exposed with or without the neighboring or illusion-inducing lines, which could be brought into view or taken away at will by the experimenter. He noticed that, upon the bringing in or taking out of the illusion-inducing lines, the illusory effect sometimes developed or disappeared slowly and sometimes suddenly. Wingender explains this variation in terms of individual differences. He states, however, that cases were rare where both the development and disappearance of an illusion took place suddenly for any subject. A similar phenomenon was noticed in connection with the controlled production of disparation in stereoscopic vision. The paper reports the confirmation of a number of facts regarding the influence of analysis, synthesis, point of fixation etc. upon the amplitude and character of space illusions.

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TIME PERCEPTION AND RHYTHM

BY P. F. SWINDLE

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There is either a practically complete dearth or an abundance of work on the perception of time—this depends on our viewpoint. If the expression “time perception” must be used either in the title or in the body of the paper, the interest shown for this subject appears to be accidental and almost negligible. On the other hand, if we consider that every response an organism can execute has a specific temporal attribute and that manifesting a conscious response means the perception of a characteristic and definite time—independently of whether or not this conforms with any of our physical measurements that may indicate *according to them* the duration of the response—numerous investigators have been concerned with time perception in one or another of its various forms. With this last consideration in mind, I have selected for review a small number of articles on the perception of distance, as well as the very small amount of work which is unmistakably on time perception.

The work on rhythm is small in amount, and it is similar in certain respects to the work on time perception. The term rhythm, like time perception, is very equivocal.

Kaila (6) offers a nativistic and empirical explanation of space perception. The classification of our perceptions of space into the two- and three-dimensional seems to have but little foundation. Each response, as was earlier suggested by G. E. Müller (Lotze is not mentioned in this connection), has its own spatial attribute, and its manifestation means the perception of space in a particular form or dimension. If we touch the tongue, the associated peripheral and central structures that respond are different physiologically from those which respond when the leg is similarly stimulated. The accompanying sensations are also different. If we speak of the tongue or the leg we are by this act reporting a perception of space, either two- or three-dimensional, this depending to a great extent upon the other ways we are responding at the same time. The same things can be said of the peripheral and central visual structures. The expression “local sign” means an association of a peripheral and a central set of structures. Each “substitute for the local sign” is itself a local sign; only it is one that is

acquired through experience or training (*Erfahrung*). The spatial attributes of the original and the new nervous complexes are different. Through training two or more sets of peripheral structures may be associated with one set of central ones. Therefore, under similar conditions of stimulation we may make the same estimation of distance when points at different regions of the retina are stimulated.

Kipfer (7) observed the second and third of a series of four fusion figures which were formed from eight hairs by means of the haploscope. When the component images of one of the fusion figures were not more than 0.375μ apart, i.e., $\frac{1}{8}$ the diameter of a retinal cone, there was in neither case a crossed or uncrossed disparity of them; both figures appeared simple and at the same distance from the observer. When the hairs for figure No. 2 were adjusted so that crossed disparity should occur there, the subjects, who attempted to hold the eyes entirely still, made the following observations: No. 2 crossed and No. 3 simple; No. 2 crossed and No. 3 uncrossed; No. 2 simple and No. 3 uncrossed. If the eyes moved any at all, these results are exactly what one should expect. It is essentially the same as walking to the right to see one side of a house and back to the left to see the other. K. speaks, however, of this as a phenomenon of contrast and does not consider it in the simple way here indicated.

Wölfflin (12) found that with the increased thickness of objects the better were they detected by blind subjects who did not actually come in contact with them; and that objects consisting of different substances were detected by the subjects at different distances. When wood was brought up close to the subject and then gradually removed it disappeared when closer to the subject than when it was brought up first from the distance; for cardboard just the reverse was the case. When the weight of a body was increased 300 per cent. the increase in the acuteness of perception for it at a distance amounted to only ca. 5-10 per cent. The acuteness of perception increased much more slowly with iron than with wood or cardboard of correspondingly increased thickness. When a double clothes line mask was placed over the head of the subject, the distance perception for an iron plate sank from 1 m. 65 cm. to 1 m. When two such iron plates were superimposed, one behind the other, they disappeared at 1 m. 10 cm.; and when a triple mask was used, this value sank to 90 cm. W. believes that radiations (*Strahlungen*) characteristic of the different substances, and perhaps quite un-

known to us yet, are emitted from the surfaces of the various objects and stimulate especially the forehead.

Carr and Hardy (2) studied the judgments of the relative amounts of motion of two lights which could be adjusted in different ways. Some of the more important results are: 1. Perceptual accuracy is a function of both relative and absolute intensity. On the one hand an inequality in the intensity of the lights is a condition for more correct judgments than is equality. On the other hand when they are equal in intensity, the greater number of correct judgments occur with the lower illumination. The degree of illumination is possibly the more effective of the two factors. 2. The amplitude of motion is not an important factor. 3. In the majority of cases, perceptual accuracy is greater for the faster rates of motion. 4. The greater perceptual efficiency was attained by fixating the stationary object. 5. When one of the lights was stationary, some individuals gave the better judgments when the moving light was fixated; the majority, however, perceived the extent of motion more accurately with stationary eyes, *i.e.*, when the moving light was perceived with indirect vision.

Frey and Meyer (3) made a detailed investigation of the means of perceiving motion of the thumb and lower arm when the angular velocities of these were slow and the amplitudes of movement small. The velocities approximated 10'/sec. The threshold for the perception of movement of the arm is invariably higher than for the thumb, the latter having the more sensitive skin. By anesthetizing the skin at the points of contact of the apparatus, the threshold for the perception of movement of the arm was increased about five to six times; and when the wrist was stimulated with a weak faradic current, the threshold was almost doubled. A strip of adhesive plaster (*Leukoplast*) measuring 4.5 cm. by 10 cm. was stuck to the fully extended arm in such a way that the middle of it was about on the olecranon. The threshold for flexion was reduced to about one half of that for extension. Flexion of the arm meant stretching the plaster and accordingly affecting a greater number of pressure organs in the skin. The authors believe the slow motion of small amplitude used in their experiments is perceived through the pressure sense only. They call attention to the possibility that even in rapid motion the kinæsthetic sensations might be of very little importance; the rapid motion results in deforming the skin more suddenly and accordingly in stimulating a greater number of pressure end-organs per unit time.

In a separate article, Frey (4) reports similar results which he obtained from a subject whose elbow had been mutilated by shrapnel, fracture of the proximal end of the ulna. Two months after an operation—when the experiment was performed—the sensibility in the joint could not be established; the deeper lying nerves had not had time to develop. The angular velocity employed was 5'/sec. instead of approximately 10'/sec., but the threshold was found to be approximately the same as that determined by Frey and Meyer (3) on normal subjects under conditions of experimentation which were otherwise the same. F. determined, also, that voluntary movements of small amplitudes of an anesthetized finger may be executed according to instructions but without being perceived by the subjects.

Werner (11) presented alternately two series of the same number of electric sparks in a slow tempo. When the sparks of only one of the series were intense, the duration of this series was underestimated relatively. When the tempo of the elements of both series was made more rapid, the duration of the series of intense sparks was overestimated relatively. W. explains these results on the assumption that when the tempo is rapid and the sparks intense the observer involuntarily and unconsciously directs his attention to the sparks primarily, while if the tempo is slow and the sparks intense the observer then has the opportunity to direct his attention to the pauses as well as the sparks. W. concludes that a series of sparks which are not too intense and which occur in a relatively slow tempo should be considered a rhythmical series and that it is perceived as such, the pauses being the unaccentuated elements. A series of alternately black and white forms, *e.g.*, squares, may or may not mean a visual rhythm to the observer; if the attention is directed primarily to the dark spaces these would be the group accents, if primarily to the white spaces they would be the group accents, and if to one as much as to the other the series would be non-rhythmical. At least three forms, two of which are identical, are necessary to arouse the rhythm consciousness. If the background is white, two black forms separated by a white one are more easily perceived as rhythmical than are two white forms separated by a black one. Two adjacent forms are never perceived as rhythmical; three is the minimum number.

Isaacs (5) reviewed a large number of articles on rhythm, and defined rhythm as the experience arising from the periodic, pendular, reflex response of characteristic organs to objective stimulation.

Visual rhythm is essentially the same as any other rhythm. Since two elements of the series cannot be coexistent, the visual rhythm is temporal in the aspect of serial stimulation. To the present writer the discussion of the refractory phase of muscles in connection with rhythmical acts is not very clear. More indefinite still is the discussion of attention as a factor in rhythmizing a series of elements. He states, "Rhythm arises from the reflex response, accent and grouping are the result of attention."

Philippe (8) describes a rhythmical series as a number of shocks or sensations separated by pauses or cadences. According to P. there are such things as semi-voluntary or even involuntary rhythms, for example, breathing, the heart beat, and some of the rhythmical movements of the skeletal muscles, but he is interested primarily in conscious rhythms of which voluntary movements are the elements. He would consider speaking as a modified form of breathing, and, as breathing can be controlled to a certain extent, the cadences in speech can be controlled also. A voluntary rhythm may be affected appreciably by an involuntary or semi-voluntary one. Reading poetry, singing, and dancing are some of the more spectacular forms of rhythmical activity. Any of these rhythms is contagious in all of the nerves and accordingly involves all parts of the mechanism.

Swindle (9) and (10) investigated rhythms of bird, reptile, crustacean, and human subjects. His results seem to justify the definition of rhythm of movement as a series of associated elements which are accentuated as regularly or irregularly as the organism has been trained to produce accents. An accent is a composite element of a series of associated, pendular movements. It indicates an unusual amount of muscular energy but not necessarily an increase in the amplitude of movement. If the initial element of a series of movements is conditioned the response runs its course unless it is inhibited by some other response, and even then it continues but as a weak response instead of a strong one. If the inhibiting response is introduced at the sixth element of a series, it becomes associated with that element and complicates it. We have then a unitary 6-group with a final accent. If the organism is stimulated in such a way at the third movement that this element is complicated by a brief response which does not inhibit the last three elements of the 6-group, a series of two 3-groups, *i.e.*, a 3-rhythm, is established. In this way we may establish a large number of 3-groups or groups of any other numerical value. The

process of modifying every third element of a dominant response of many elements is the process of modifying at the same time every third element of many other subdominant or weak responses consisting of many elements. These subdominant responses are executed simultaneously with the strong one and their natural tempos are forced to be that of the strong one. (Bock's (1) data make it clear that this statement is not inclusive enough. In reality, the subdominant responses occur not only in the same tempo as the dominant one but also in other combinations such as higher and lower "octaves" of the strong response.) This circumstance of the "forced" tempo has two important consequences. 1. Train an organism to produce a rhythm with a bodily member, and it will also produce with the same and other members rhythms of the same numerical value, but in various tempos, directions, and amplitudes of movement. 2. When the 3-rhythm is dominant or strong the 7-rhythm (and any others that the organism has learned) is present as a subdominant one, and vice versa.

Bock (1) worked with the unitary groups of human subjects. He instructed his subjects to tap with the finger on a tambour, as long as they wanted to, to rest as long as they wanted to, then to tap again, etc. He secured kymograph records of a large number of groups and pauses. He made the following very significant discoveries for which Swindle's technique was not entirely adequate: 1. "The tempi of the groups are to each other as the ratios of small integers, octaves and fifths predominating"; the same is true generally of the durations and also the numerical values of the groups. B. states, "The organism, when beating the 22 group, is simultaneously beating and simultaneously conditioning multiple groups in related durations and tempi and the same groups in related durations and tempi." Further, B. presents a "theory of intergrands" which is interesting for several reasons and which the present writer feels should be read in full, since it is very much condensed as it is. It seems as if B.'s results might have far-reaching significances for theory.

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GRAPHIC FUNCTIONS

BY JUNE E. DOWNEY

University of Wyoming

One of the most significant reports on mirror-writing with which the reviewer is acquainted is the recent one by Pfeifer (6). Pfeifer studied the case of an illiterate man of good intelligence who was taught to write eight words. After such instruction, when he was asked to use the left hand, he commenced writing at the right edge of the paper and produced a rapid free, well-coördinated mirror-script. The left-hand writing (adductive) which resulted when he started writing from the left edge of the paper, was slow and uncoördinated. Practice in such left-hand writing was next instituted. It was produced with effort and with a particular inhibition operating in the case of letters previously learned in writing with the right hand. After the left-hand writing of the given words was well established it was found that they could be written by the right hand, fluently in mirror-script but with difficulty in abductive script. A resumption of practice with the right hand showed inhibitions in the form of a tendency to symmetrical movements operating to such an extent as to make impossible, at least for a time, the former free rapid movements.

In an attempt to answer the question which hemisphere initiates such inhibitions some very valuable hospital observations are cited.

For example, it is found in teaching patients who are paralyzed on the right side to write with the left hand that increased awkwardness of the left hand does not accompany a greater extent of paralysis. Quite the reverse. Apparently, in total paralysis, the inhibitions are removed which would in health be initiated by the left hemisphere. There is, on the other hand, evidence of strong inhibition operating in cases of partial paralysis.

Amputation cases afford another field for observation. Learning to write with the left hand under such circumstances is not directly comparable to the acquisition of left-hand writing by the paralytic.

The observations indicate not a native incapacity of the left hand but rather an incapacity resulting from inhibitions originating from habitual use of the right hand. It is urged in conclusion that the problems of handedness need restatement.

Watson (9) in his summary of the instinctive activities of infants reports on several methods of attack of handedness, such as relative duration of suspension with right or left hand; registration on a smoked drum of relative amount of activity of the two hands; measurements of the diameter of the right and left biceps, and the length of the right and left forearms from the elbow to the second joint of the midfinger. He states "We are left without conclusions as to the problem of handedness."

A critical statement concerning various problems that center around handedness is given by Kerr (5). Dextrality is defined as the "specialized aptitude or capacity associated with the psychical phenomena of speech and reasoning which is so marked in the left brain." Three classes of functional attainment in dextrality are described: (1) "The highest development of both hands in true ambidexterity"; (2) "The ordinary development, one hand well developed in function, the other mainly accessory"; (3) "Defective functioning of both, a poor dextrality which is more an ambisinistrality and probably includes many so-called left-handed." With the small first class is associated high intellectual expressive attainments whether by hand or word. In the majority who constitute the second class right or left-handedness is an accident which does not affect mentality. The last class includes individuals whose dextrality has not developed properly and who show not merely *gaucherie* but speech defects and many degenerative stigmata. Kerr states that in cases of poor dextrality associated speech defects are common but that the evidence for direct production of speech defects through faulty training in handedness is trivial.

Barnils (3) calls attention to the unsolved problems of the hereditary elements in language. The observation of accent in the speech of a deaf-mute immediately on his recovery of hearing and the recognition of dialectical accents in pupils in a school for deaf-mutes call in question the assumption of a minimal predisposition. Other observations are cited in support of a predisposition to a verbal-motor image of a particular sort.

Hertz's (4) scholarly treatment of the historical development of certain graphic symbols is of anthropological, rather than of psychological, import.

A valuable study of graphic disturbances resulting from rapid or chronic bromide poisoning in epileptic subjects is reported by Ammann (1). A knowledge of such changes is of practical value in the detection of intoxication. A number of graphic signs of poisoning are listed and illustrated by specimens of the writing of a patient during an attack and at various stages of recovery until writing was restored to normal. Such graphic symptoms include writing-tremor, ataxic writing, vacillating and pressure-weak writing, and spatial difficulties due to loss of visual control. There results from this last cause inability to follow a line or to space words properly. Writing size fluctuates. Most patients show a decrease in writing amplitude due to the difficulty of movement and to emotional depression. On lined paper the size of writing remains normal except in cases of very severe poisoning. Errors in alignment follow the dominant mood. The author cites his observations as in complete agreement with the contention of graphologists that rising alignment is a sign of exaltation and falling alignment of emotional depression. Various graphic lapses occur in the writing of the cases studied. These graphic lapses parallel the speech disturbances. Perservative lapses are very frequent.

The general effect of oxygen deficiency upon handwriting is reported by Watson (9). At 22,000 feet legibility and alignment were seriously affected and, also, accuracy in copying words. The cuts used in illustration show also other evidences of tension not evaluated by Watson.

The growing interest in handwriting as a possible material for psychological study is evident in the increased space devoted to it in the newer textbooks. Although graphological contentions are dismissed summarily, the problem of graphic individuality is recognized.

Investigation of pedagogical problems of handwriting continues.

Since voluntary and involuntary imitation both play a part in acquisition of skill Almack (2) calls attention to the quality of the teacher's writing as influential in determining the pupil's progress. Obtaining specimens of the penmanship of about forty per cent. of the rural school teachers in Oregon, he concludes that twenty per cent. of rural teachers do not write well enough to qualify them to teach penmanship, the minimum attainment being set at quality 11 on the Thorndike scale.

Starch reports further results obtained in rechecking the values of the Thorndike and the Ayres writing scales. Some of the discrepancy found in ratings appears to be due to differences in the samples of writing produced by printing; to differences in groups of judges; and to differences in public opinion between today and ten years ago regarding merit in penmanship.

Supplementary work in revision of the Starch writing scale is also outlined by Starch. The twenty steps of the original scale are increased to twenty-five.

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MEMORY, THOUGHT, AND LOGIC

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Fernberger (1), with the aid of ten observers, subjected the process of comparing to introspective analysis. He used lifted weights, length of lines, noises, and series of grays and proceeded just as is done in quantitative experimentation, but instead of centering the attention solely upon the objective results, it was centered primarily upon the conscious processes involved. Immediately upon rendering his final judgment, an introspective description was given by the subject of everything that appeared in consciousness from the first to the final comparison. The process of comparing was found to consist essentially in the awareness of a change or persistence of an actually innervated muscular set, while the structural components consist primarily of sensations and images. The attributive pattern of the process varies to a certain extent with the material presented.

Under the title "An Experiment with an Automatic Mnemonic System," Hill (2) gives us, not an experiment on memory, but a description of an ingenious mnemonic system, devised by himself, together with pedagogical suggestions in respect to its use in a psychology class. He suggests the following values when used as a class experiment: (a) It demonstrates and then exposes a method by which some traveling lecturers on memory startle their audiences by seemingly difficult feats of memorization. (b) A right evaluation of the mnemonic principle is made possible. (c) The process gives a cue and an impetus for the study and analysis of associative processes. (d) It is productive of interest in the possibility of modifying learning processes by means of economical methods rather than by trial and error. (e) It may be made a stimulus to experimentation of a serious nature.

Whipple (6), in 45 numbered topics, develops the psychology of observation and report as a text for the Students Army Training Corps. The first six topics are introductory and deal with the importance of full and accurate information as a guide to action for the individual and especially for a group, like an army. Topics

7-19 deal with sensation and bring out the significance of sensory defects, variations in acuity, illusions, and the like. Hallucinations and the influence of expectation are treated in topics 19-23, while the next four topics deal with the nature and limitations of attention. Memory and its operation are treated in topics 27-35, when the treatment shifts naturally to testimony, collusion, and the outstanding characteristics of written reports, topics 35-44. Topic 44 deals with the factor of certainty as felt and indicated by the reporter, and topic 45 with the estimation of distances, heights, angles, number and dimensions.

Warren (5), in exemplification of the well-known fact that in old age incidents of early life are often recalled without apparently having been brought up meanwhile, reports two well authenticated cases of long latent memory. D. T. W., at the age of 90 suddenly recalled and recited in part a poem that he had learned and recited when he was about fifteen. J. R. D., at the age of 83, on the occasion of being offered an honorary degree by Dartmouth for being the oldest living alumnus, recalled and delivered his Freshman oration which had been delivered 69 years before. In both of these cases it seems clear that there had been no intermediate recall.

In discussing the syllogism and other logical forms, Shelton (3) restricts formal logic to deduction and differentiates this from induction or "methodology." He emphasizes the process of formalizing, yet does not lose sight of the fact that truth pertains to reality and is always subject to empirical verification. The syllogism, whose "object it is to formalize and verify, not to displace ordinary rough and ready argument," he recognizes as the primary form of deduction and he maintains that every argument, valid or invalid, can be expressed in the form of one or more syllogisms. When this is granted it follows that all other logical forms are but variations of the syllogism, that they imply the syllogism, and that they may be reduced to the syllogism. Of these other forms he briefly discusses three: (a) hypothetical arguments, (b) substitution of similars, and (c) arguments *a fortiori*. He shows that in each of these a universal is implied and that there could be no argument without this universal. Teachers of logic will find Shelton's discussion integrating and helpful.

Under the heading "Sixteen Logical Aphorisms," Swenson (4) divests himself of sixteen detached paragraphs which may be logical in the sense of being true but they are not logical in the sense of belonging to logic. They belong to the realm of meta-

physics and to the scholars in that field they may be left for consideration. A person not versed in recent philosophical discussion is not likely to be either enlightened or entertained by them.

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MEMORY AND LEARNING

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McDougall and Smith (4) find in the correlations between performances in certain tests support for Bergson's distinction between mechanical retention based on repetition, and "pure memory"—the memory of unique specific experiences. Tests in the recognition of ink blots following one presentation, and in the description of a picture after a few seconds' exposure gave a correlation of .53. There was a correlation of .61 between the memorizing of nonsense syllables by the learning method and the formation of a two-letter typewriting habit. But the other correlations between these four sets of data varied from -.11 to .03. The authors accordingly group the picture and blot tests as those involving "pure memory", and the others as tests which call for a memory showing the characteristics of habit formation. A fifth test, in the reproduction of the meaning of a prose passage after a single reading, may be thought—and the correlations bear this out—to have a place in each group since it gives opportunity for the reproduction verbatim of often used phrases with that of new ideas. The same article reports an experiment on "the influence of conation on the learning process." The subjects were instructed to learn certain nonsense syllables passively by repetition, and others as quickly as possible with full mental activity. Conation, incidentally, brings with it a

number of other factors—the noting of a syllable's position, for instance, or the affective reaction to it. The number of repetitions needed for complete learning was greater with the mechanical method and increased with the subjects' practice in passivity. The effects of this method, moreover, measured by re-learning and recall wore off more quickly.

Wells (6) uses reaction times and the accuracy of verbal responses as measures of the thresholds of conscious learning. His stimuli were words, paired with numbers which were duplicated on reaction keys. The pairs were shown in series, every one given a gradual exposure. The subjects were instructed to react by pressing the key corresponding to the number at hand—in the first round, as soon as the number appeared; in following series, as soon as possible after the first letter of the word had been seen. In the course of several or more rounds the words were connected with the proper responses. Wells considers that with the key responses, the initial reaction time represents the connection below consciousness; the gradually shortened reaction time, its approach to the threshold; and the anticipatory response, its presence in consciousness. In the verbal series, the false and negative responses show that the connection is subliminal; the doubtful responses, that it is just above the threshold; and the correct, certain ones mark its full establishment in consciousness. The fact that progress with the verbal responses was slower than with the key reactions, points, Wells thinks, to a partial dissociation between the two forms of connection.

Mitchell (2) offers experimental evidence against the assumption that an individual's memory span can be determined once and for all by a single day's test. He gave two sets of group tests to fifth and seventh grade children, dictating series of digits of from three to ten members to be reproduced in writing. Some trials were separated by two days, others by ten. While the average score for the group did not change in the second trial, the individual's rank in the group might: the scores of more than half of the children varied by one. The variation was greater when, instead of the usual score, the "maximum series" value was used. Mitchell concludes that although his method was not strictly that of the intelligence scale, his data indicate a need for revision in the use of the test for memory span.

Dashiell's investigation (1) of the relative merits of complete and alternate learning of two habits was under way when Pyle's

work¹ on the problem was published. Dashiell's experiments are more extensive, including maze running with children and rats, and adult tests in tracing mazes, card sorting and adding. The evidence from the animals and children in terms of the number of trials is inconclusive or slight; but in all other counts, the method which allows complete learning of the one habit before the other is attempted is the more economical.

There are three non-experimental articles. Stratton's conclusions (5) are drawn from his students' reports of their memory of unexpected crises in their experiences. They noted sometimes hypermnesia, sometimes hypomnesia, for the events experienced during excitement, but total amnesia only in instances of physical blows. A permanent retroactive hypermnesia, usually extending over not more than a day, or alternations of vivid recollections and periods of amnesia of events preceding the excitement may be the lasting emotional effects. Piéron (3) in a discussion of the psychophysics of forgetting, criticises Ebbinghaus for having blurred true forgetting with an artificial effacement through his succession of learning series. Foucault,² however, meets with the weight of the criticism: Piéron objects to the uncontrolled variations in his experimental conditions, to his equanimity over a serious disparity between his observed values and those calculated from his formula, and to a psychological inference so unparalleled in Biology as his that there is no true forgetting but only inhibition through interference. Piéron offers his own formula which gives a small disparity with experimental results, and which has the biological advantage of approximating formulae for the loss of acquired inhibitions in various species of animals. Wrinch's consideration (7) of the differentiae of memory acts is not psychological but epistemological. There may, however, be starting points for psychological investigations in her concluding definition that a memory act is an image act; that unlike an act of imagination, it is accompanied by a feeling of familiarity; and that all memory acts involving beliefs involve at least one primitive belief.

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ATTENTION AND INTEREST

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Liddell (3) put to the test of direct registration Ferree's theory that attention waves are due to the adaptation of the part of the retina stimulated, as an explanation of the disappearance, and to the movement of the eyes as an explanation of the reappearance. He registered the eye-movements photographically by the Dodge apparatus simultaneously with the disappearances and appearances of a minimal light. The results showed no relation between the movements and the fluctuations. The waves continued while the eyes were stationary, movements during the period of no sensation did not bring back the light, and movements during the visibility period did not prevent the disappearance.

Dallenbach (2) replies to critics of his earlier work. Miss Bowman (1) shows that size is comparable with intensity as a determinant of clearness. Two Greek crosses of different sizes outlining areas of variable brightness were placed equal distances to each side of a fixation point and four observers were asked to compare the clearness as the intensity was varied. Three trained subjects found that size compensated for differences of clearness. The ratio varied from 3 : 1 to 4 : 3. For one untrained subject no compensation was apparent.

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VALUES

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The brilliant work of Anderson (2) in the field of economics concerns the psychologist as being primarily the application of an adequate psychology of value, first to the general theory of economic value, and then to the theory of the value of money. The author of "Social Value"¹ restates the same general position in his more recent work, with insistence on two main points,—the need of an absolute concept of value for the economist, and the advantages of a social value theory as opposed to an individualistic utility theory. In the light of an economic theory based on social psychology he examines critically the significance of "ratio of exchange," "supply and demand," and "marginal utility," and attacks the problem of the nature of credit phenomena, especially in their relation to the general laws of value. Chapters I, V, and XXIII contain the more purely psychological discussion.

Three articles deal mainly with an introspective analysis of the value experience. Shand (12) in his analysis of the affective and cognitive elements in intrinsic and extrinsic value finds feeling the primary element, and intrinsic value the characteristic experience. "When we acknowledge the value of certain qualities in a cold, intellectual way, we have either realised their value emotionally in an earlier period, or we have accepted it through social suggestion." The emotions having a tendency to attribute intrinsic value to the things that excite them are joy, admiration, wonder, satisfaction, gratitude, sorrow, and pity. Of the eleven laws of value formulated in the article the following two may be cited as typical: "Whenever anything has some intrinsic value (as money), the extrinsic value which it has tends to increase its intrinsic value." "The succession of joy, sorrow, and desire about a loved object enables us to approach a truer judgment of its real and intrinsic value for us."

Picard (9) observes much the same elementary distinctions as Shand. The basis of immediate values is in feeling; that of con-

¹ For a detailed review of "Social Value" cf. the BULLETIN, 1911, VIII, 432-436.

tributory values is in cognition. Contrary to both Bush and Dewey he endeavors to show that it is not necessary to judge even when we value in a contributory fashion. Such valuation may have been the outcome of a cognitive process, such as perception or memory, without its reaching the judgment level. The mere behavioristic fact of making use of something is sufficient to establish a contributory value situation, but judgment may or may not have taken place.

Bartlett (4) traces five separate stages in the genesis of critical appreciation: (1) Simple appreciation, characterized as mere like or dislike without any reference to the past. (2) The feeling of familiarity, involving a modification of likes or dislikes according to a reference to the past, but without any separately imaged occurrence. (3) Conventional criticism, involving a reference to empirical standards. This is the outgrowth of much unanalysed experience, of many feelings of familiarity, some of which have become particularly vivid. Its references are rarely accompanied by reasons. Instead it offers emphatic assertions, generalizations, catch phrases. (4) Rational criticism, characterized by its appeal to principles founded on analytical investigation. (5) Intuitional criticism, in which the critic, having become more reliant on his own sensitiveness, ventures to express his appreciation again in a direct way, without appeal to either convention or principles.

The philosophical literature on the topic abounds in controversy and mutual misunderstanding. Bush (5) considers three very different definitions of value that have been offered respectively by Dewey, Sheldon, and Perry. Dewey's instrumentalist definition seems to him to make value synonymous with use, while Sheldon by his heroic measures to emancipate value from ego-centric difficulties has only succeeded in rendering it indistinguishable from causality. Bush inclines with Perry to reserve the term for situations involving bias or interest, and finds the ego-centric predicament not intolerable as regards valuation, because of the high degree of similarity in the affective natures of different individuals. Dewey (7) replies to the effect that Bush has misapprehended the instrumentalist theory of value in assuming that "value occurs when we face the question as to what methods are useful." Dewey himself states that the question which involves a value judgment is: What ends are desirable? Instrumentalism simply emphasizes the fact that we proceed experimentally in determining what ought to be done. It is not concerned with the technical question of how to attain a given end.

Urban (14) reaffirms as against Perry and Fisher his position regarding the value objective. He points out that Fisher, being in agreement with him as to the essential distinction between value and being, and as to the possibility of knowledge of value, becomes involved in needless inconsistency when he refuses to go further and admit his distinction between a truth judgment and a value judgment. With Perry his disagreement is more fundamental. For Perry value is merely a subjective addendum to reality, and not essential to the reality concept itself, as it is for both Urban and Fisher. Perry's relational definition of value should logically compel him to deny that there is any knowledge of value at all, "for judgment merely apprehends the facts about our interests and the relations of objects to our interests."

Schiller's (10, 11) quarrel is with the anti-pragmatists, particularly Wells. He objects vigorously to Wells' assumption that "the pragmatic fallacy" lies in confusing truth and value. Pragmatism does claim that the true is a species of the genus "value," but in this respect makes it coördinate with the good, the right, the beautiful, the pleasant. This claim has strong support in speech usage. "We no more hesitate to say that an argument is good and right, and that a piece of reasoning is beautiful, than conversely that a statue observes the true proportions, or that an enemy is false."

Despairing perhaps of finality in any philosophical controversy Costello offers an article (6) entitled "The Value of False Philosophies." The interesting paradox here presented is that although the primary business of philosophy is truth, the net result has been not truth, but value. The ideas of the great philosophers have generally been false, at least to the extent of onesidedness, but "the gaining of an insight into their vision is a priceless experience."

Katuin (8) raises the question how we arrive at an objective scale of values, such that we may say of one value that it is greater than another. And, in conformity with Dewey and Anderson, he finds the standard in the social process which the individual undergoes. For the pragmatist the seat of objectivity has come to be the social institution. The supra-individuality of the social mind is offered as the escape from subjectivism. By contrast with this position the very suggestive chapter of Adams (1) on the autonomy of values offers in the name of idealism an objectivity not far removed from the realism of Russell and Moore. Though recognizing that something in the way of feeling is always involved in

our value judgments, he dissents from the statement that the basic situation in such judgments is either interest or feeling. The worthwhile is more than the mere equivalent of the desirable, and this residue of meaning provides for the possibility of an objective good, something lodged in the environment, "at a distance from the feelings which are the immediate possessions of the organism." Esthetic values and disinterested love are cited as having contemplative aspects which place them in another psychological category than that of desire. Urging the importance of the Platonic insight as to the stability and certainty of the good, he holds "that we discover values much as we discover truths," and that the values do not depend on the organization of our interests. "Feeling is the stimulus and vehicle of our value judgments, but neither their object, nor properly speaking their source."

Shaw (13) and Blechmann (3) are concerned mainly with interpreting the function of value in life. Both find that value furnishes the key to the distinction between evolution and progress. Shaw's position approximates at many points the "purposive psychology" of Münsterberg.

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SPECIAL REVIEWS

Memory and the Learning Process. DARWIN OLIVER LYON. Baltimore: Warwick & York, 1917. Pp. 179 + 8 Pl.

Memory in common speech, Lyon reminds us, is "a gross unanalyzable term, having no claim to represent an elementary function of mental life," but standing for various independent experiences and operations. This position, familiar enough in psychology, perhaps should be repeatedly stated until it is widely recognized; but it is hard to see what contribution Lyon's development of it makes to psychological literature. If his discussion is to be much more than a list of the meanings which a term may have when loosely used; especially if it is to rank as scientific analysis, we expect, for one thing, that he will draw clean lines between the psychological aspects of memory and their possible physiological correlates. This he does not do when he apparently makes coördinate the four components into which he resolves the memory "act". He characterizes these mainly in terms of their values, but the first two are probably physiological: "with retention pure and simple the mind is not conscious that any of these knowledges exist for as soon as consciousness enters we have reproduction and representation"; and "reproduction is the process by which objects that have previously been shown . . . are brought back into consciousness for representation and use." Representation and recognition, on the other hand, seem to be more immediately in the province of psychology: representation is the "stage . . . that consists in the mind presenting to itself the objects that have previously been known"; and recognition, that in which "the object is recognized as having belonged to or been in connection with a past experience." The confusion which may come, to the reader at least, from so unfocused an analysis of memory is not lessened by Lyon's terminology, which often attributes to mind a dynamism which does not tally with psychological description, and by an apparently interchangeable use, on occasions, of such words as mind and cerebrum. The various classifications of memories, too, seem to call for specifications as to whether the subject in hand is psychological process, or physiological process or hypothesis, or, perhaps, "objects" previously known.

The experimental section of the book deals with several problems in learning. Besides summarizing the earlier work, the author reports his own experiments already published in detail in the *Columbia Univ. Psychol. Arch.* and the *J. of Educ. Psychol.* Research covering several years gives data on the relation of the length of the material to the time needed for learning it, and indirectly on the most favorable distribution of time. Lyon was his own subject, and learned his material by the "continuous" method, with complete mastery at one sitting, and the "once-per-day" method, which allows one presentation a day until complete learning. He concludes from this experiment that with meaningful material like poetry and prose, the total learning time varies directly with length of the material, except when the "continuous" method is used with passages of more than a thousand words; with digits and nonsense syllables, however, which he learned by verbal motor associations, while the "once-per-day" method gives approximately the same results as with the other material, with the "continuous" method the learning time seems to vary directly with the square of the length of the material.

Lyon's further experimentation was on the relation between quickness of learning and retention. Since his four hundred and more subjects were drawn from schools, universities, colleges, business offices, asylums, prisons, he has incidental conclusions as to the relations between these two aspects of learning and such conditions as age, sex, social position, and education. His measures of retention were three: amount reproduced of material previously learned, without new presentation; amount reproduced after one new presentation; and time for relearning the material. The subjects were free to learn the material as they chose, and to make their confidence that they knew it the criterion for complete learning. Such instructions, unfortunately, may easily make for variations in conditions which ought to be kept constant; and such introspections as subjects not specially trained can give are not to be taken too seriously as a control. So the differences in results, on the whole slight in themselves, may point to other varying conditions than those with which Lyon reckons—material, measure of retention, quickness of learning. As the results are given, both of the methods of reproduction afforded positive correlations between quickness of learning and retention, highest for prose, lowest for digits. Using relearning time as the measure, Lyon found this relation to hold for prose and poetry but not for digits. Nonsense syllables appeared to

follow the prose and poetry; single words, the digits. The averages of the results of the three methods, whatever their significance may be, showed positive correlations for all materials except digits. It is the logical material, Lyon concludes, with which quick learning will be followed by long retention.

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Psychology, From the Standpoint of the Behaviorist. JOHN B. WATSON. Philadelphia: Lippincott, 1919. Pp. 430.

For the structural or functional psychologist the table of contents of this new text will reveal the absence of many topics that in the past have been regarded as fundamental. In the preface the author discusses his position and outlines the principles that guided him in the selection of his material.

Chapter I is devoted to a brief discussion of the origin and methods of behavior psychology. The goal of the study of human behavior is represented as the "ascertaining of such data and laws that, given the stimulus, psychology can predict what the response will be; or, on the other hand, given the response, it can specify the nature of the effective stimulus." The responses are classified into four groups. (1) Explicit habit responses. (2) Implicit habit responses. (3) Explicit hereditary responses. (4) Implicit hereditary responses. The ten chapters that follow are concerned with the structure, function, genesis and development of these forms of behavior. Chapter II takes up the psychological methods, of which four classes are described. (1) Observation with and without experimental control. (2) The conditioned reflex methods as applied to motor and secretion reflexes. (3) The verbal report method. (4) Methods of testing. The discussion of introspection is to be found under the verbal report method. In Chapter III, devoted to receptors and their stimuli, is given the material usually found under sensation and perception in conventional psychological texts. The modifications that occur are such as result when the emphasis is placed on the neural and behavior phenomena. The order in which the receptors and their adequate stimuli are presented is as follows: cutaneous, kinesthetic, equilibrium sense, organic sense, taste, smell, audition, vision, visual hallucination. Watson gives the material usually presented under the brain and nervous system, *after* the discussion of the sense organs:

Chapter IV includes a discussion of the elements of neuro-physiological conduction under the headings: the neuron, reflex arc, neural laws, cerebrospinal system, ganglia, conduction paths, the sympathetic nervous system. The functional relationship between the sympathetic and the cerebro-spinal system is especially well worked out. Chapter V is devoted to the organs of response. The topics are: functioning of striped muscles and reflex arcs, types of reflexes, nature and function of smooth muscles, salivary glands, pancreas, liver, kidney, thyroid, parathyroid, adrenal apparatus, pituitary apparatus, pineal gland, sex glands. The comprehensive treatment of the glands is an innovation that will be appreciated by those psychologists who regard the general metabolic constants of the individual as an important factor in the modification of behavior. The emotions are discussed in Chapter VI under hereditary responses. An emotion is defined as "an hereditary pattern-reaction involving profound changes in the bodily mechanism as a whole, but particularly of the visceral and glandular systems." The more fundamental emotions of fear, rage, love, are described in detail. The interrelation of the emotions, the methods by which they are studied, the character of the original emotional patterns, the detection of implicit emotional response, emotional diffusion and consolidation, conflict and finally the rôle of emotion in daily life, are some of the topics that will strongly appeal to all psychologists whatever their systematic interest may be. The second group of hereditary responses are described under the heading of instinct in Chapter VII. The author differentiates instinct from emotion by regarding the radius of action in an emotion as lying within the individual's organism, while in instinct the radius of action is restricted to some specific form of adjustment. A classification of the human instincts is not regarded as serviceable because of the rapidity with which the pattern-reactions are modified by habit. Nursing, grasping, right- and left-handedness, defensive movements, eye-coördination, crawling, positive and negative reaction tendencies, are given detailed consideration while those instincts commonly asserted as being human, such as acquisition and possession, hunting, collecting and hoarding, habitation, migration, fighting, maternal instincts, gregariousness, imitation, manipulation, play, are described without an attempt at a rigorous analysis of the adequate stimuli for these instincts. The rôle of instinct is regarded as primarily that of initiating the process of learning.

Passing from inherited to acquired behavior, Chapter VIII

describes the genesis and retention of explicit bodily habits. After an account of the nature and development of such habits as eye-hand coördinations, reaching, learning to shoot, there is a discussion of some of the complications in habit formation under the topics, cross-education, transfer of training, habit fixation. On the neural side are found such headings as, short-circuiting in the central nervous system, the determiners of action, practice effects. Memory is linked up with practice. In the author's words, "Memory is a general term to express the fact that after a period of no practice in certain habits—explicit bodily habits, explicit word habits, implicit word habits—the function is not lost but is retained as part of the individual's organization, although it may, through disuse, have suffered greater or less impairment." The implicit and explicit *language* habits are regarded as being so important that all of Chapter IX is devoted to them. After a detailed description of the speech mechanism, of the way in which explicit language habits are formed, of the gradual transition from explicit to implicit language, Watson derives his conception of the nature of the thought process. Thought and thinking are regarded as implicit language functions which are conditioned by the same neural principles as any form of overt behavior. A separate mental or psychical factor is not regarded as essential. In Chapter X those factors affecting the efficiency of the organism are described. The effect of fatigue, the curve of work, subvocal arithmetical functions, exercise of manual functions, the effects of drugs, climate, relative efficiency of both sexes, the factors affecting the acquisition of habits, indicate the character of the discussion. The concluding Chapter XI is devoted to personality and its disturbances. The reader who expects to find under this heading the traditional discussion of *the self* will need to content himself with such topics as, general level of behavior, general survey of emotional equipment, instinctive and emotional attitude, general habits of work, activity level, social adaptability, recreation and sports, organized sex life, reactions to conventional standards, personal bias and peculiarities, balancing factors. The character of the discussion is best foreshadowed in the author's words. "Our personality is the result of what we start with and what we have lived through."

In the reviewer's opinion the outstanding differences between Watson's new book and other text-books in psychology that have appeared within the last few years lies in: (1) An objectification of the important factors in the individual that traditional psychology

describes as *subjective*. This involves more than a mere change in terminology. The change implies that there are no psychological laws in the sense that so-called psychical phenomena are in some way non-neural. For Watson there is no mind-body problem. The study of man in all his varied activities, from the simplest reflex movements to the class of activities that may be described as creative thinking, are to be regarded as functions of the sensorimotor system. (2) A redistribution of the emphasis of the traditional psychological topics so that the social significance of action is placed into more prominent relief. Human behavior is not only a phenomenon that is characteristic of the individual. It also establishes his position within a cultural group.

The illustrations, especially those dealing with anatomy, are excellent. Binding, printing and paper are also up to date. The style, as might be expected from the author's other contributions, is forceful and clear. For those who use the table of contents a more detailed classification would be appreciated. The organization of the material is a practical one so far as class use is concerned, though the author might more frequently have used classical experiments as illustrative material. This is done in some chapters and helps the instructor who uses the book in connection with laboratory work to use the equipment he already has. While the author objects to the use of simplified diagrams of neural functions and regards brain pictures, or mechanical neural schema that compare the action of the central nervous system with a series of pipes and valves as lazy substitutes for a thorough study of the function itself, it is questionable whether even with the author's detailed chapters on the nervous system and the organs of response, the student who has not had the equivalent of at least two years of biological work will have a clear theory of neural function. The reviewer does not see why such diagrams as those used by Max F. Meyer or Knight Dunlap should be any more objectionable than the diagrammatic mechanical representations of wave form, atoms, molecules, vector quantities or wiring diagrams, that have contributed so much to the development of physical theory.

The treatment of emotion is especially clear cut, and the experiments with infants that are reported are a real contribution. The emphasis that is placed on the speech reaction ought to have a great influence in removing the spontaneous and mystic element that is usually associated with the process of introspection. The reviewer has used the text in his course in experimental psychology.

It has proved very satisfactory even though not designed for this purpose. As an elementary text it will require a teacher well trained in biology and with a tolerant attitude toward the point of view that the book represents. There is a tendency at the present time for many psychologists to stress the behavioristic aspect of psychology. In a recent book a writer describes his point of view as a combination of structuralism and behaviorism. Such a statement indicates quite clearly that neither the term structuralism or behaviorism is clearly understood. A combination of mechanism and vitalism would better describe such a compromise. This confusion is rather general and it is hoped that Professor Watson's new text will help clear up this confusion and also demonstrate that behaviorism is not merely the response side of psychology.

A. P. WEISS

OHIO STATE UNIVERSITY

STATISTICS OF THE AMERICAN PSYCHOLOGICAL ASSOCIATION IN 1920

BY EDWIN G. BORING, SECRETARY

Clark University

Personal information returned by members of the American Psychological Association to their Secretary and printed in the Year Book of the Association afford an indication of the status of psychology in America. The Secretary has therefore compiled tables from the information printed in the 1920 Year Book. These data, it is true, are not exact since some members do not make complete returns and many allow information to stand after it has ceased to be correct. In general members keep data on academic rank up to date. The reports of degrees conferred have never, however, been complete, and the reports of the dates of these degrees are even less so. A great variety of fields of research is reported. The Secretary believes that the tendency for members to add new research topics which they have entered upon is greater than the tendency for them to withdraw older topics which they are no longer actively pursuing. It is also probable that the respectability of research is great enough to lead at times to a report of a field of research when there exists little more than the desire to undertake it. Nevertheless the Secretary believes that the analytical tables do constitute a picture of the status of American psychology in 1920.

Tables I-III show, by geographical distribution, the number of persons giving instruction in the various subjects of instruction. A person reporting more than one subject has been fractionated equally among the different columns. The geographical sections are those of the United States Census: *New England*: Maine, N. H., Vt., Mass., R. I., Ct.; *Middle Atlantic*: N. Y., N. J., Pa.; *Northeast Central*: Mich., Wis., Ohio, Ind., Ill.; *Northwest Central*: Minn., Iowa, Mo., N. Dak., S. Dak., Nebr., Kans.; *South Atlantic*: Del., Md., D. C., W. Va., Va., N. C., S. C., Ga., Fla.; *Southeast Central*: Ky., Tenn., Miss., Ala.; *Southwest Central*: Ark., La., Okla., Texas; *Mountain*: Mont., Wyo., Idaho, Colo., Utah, Nev., N. Mex., Ariz.; *Pacific*: Wash., Oregon, Calif. The term *Psychology* includes all

special psychologies except applied. *Applied Psychology* includes all forms of application, including educational psychology. *Education* includes experimental education, hygiene, school administration, etc. *Philosophy* is logic, metaphysics, ethics, history of philosophy, etc. All other subjects are listed as *Miscellaneous*. *No Instruction* covers the cases where no report is made in the Year Book for this item.

TABLE I
SUBJECT OF INSTRUCTION, 332 MEN
Number of Men Giving Instruction in Subjects Listed

| | Psychology | Applied Psychology | Education | Philosophy | Miscellaneous | No Instruction | Total |
|----------------------|------------|--------------------|-----------|------------|---------------|----------------|-------|
| New England..... | 23.7 | 2.5 | 7.3 | 9.3 | 3.0 | 10 | 56 |
| Middle Atlantic..... | 36.7 | 13.0 | 16.5 | 18.2 | 4.5 | 18 | 107 |
| N. E. Central..... | 34.0 | 4.3 | 6.7 | 10.0 | 1.7 | 11 | 68 |
| N. W. Central..... | 16.7 | 8.7 | 4.0 | 4.0 | 0.5 | 2 | 36 |
| South Atlantic..... | 10.2 | 2.5 | 2.7 | 2.7 | 1.7 | 6 | 26 |
| S. E. Central..... | 1.7 | 0.5 | 1.2 | 0.7 | ..... | 2 | 6 |
| S. W. Central..... | 5.0 | 1.0 | ..... | 1.0 | ..... | 1 | 8 |
| Mountain..... | 5.0 | 1.5 | 0.5 | 1.0 | ..... | 1 | 9 |
| Pacific..... | 7.2 | 5.2 | 1.3 | 0.3 | 1.0 | ..... | 15 |
| Europe..... | ..... | ..... | ..... | ..... | ..... | 1 | 1 |
| Total..... | 140.5 | 39.2 | 40.5 | 47.2 | 12.7 | 52 | 332 |

TABLE II
SUBJECT OF INSTRUCTION, 61 WOMEN
Number of Women Giving Instruction in Subjects Listed

| | Psychology | Applied Psychology | Education | Philosophy | Miscellaneous | No Instruction | Total |
|----------------------|------------|--------------------|-----------|------------|---------------|----------------|-------|
| New England..... | 2.0 | ..... | 1.5 | 1.5 | ..... | 6 | 11 |
| Middle Atlantic..... | 12.0 | 2.5 | 1.5 | 0.5 | 0.5 | 4 | 21 |
| N. E. Central..... | 2.0 | 1.0 | ..... | ..... | ..... | 8 | 11 |
| N. W. Central..... | 6.0 | ..... | ..... | ..... | ..... | 1 | 7 |
| South Atlantic..... | 1.3 | 0.7 | 0.7 | 0.3 | ..... | 1 | 4 |
| S. E. Central..... | 0.3 | ..... | 0.3 | 0.3 | ..... | ..... | 1 |
| S. W. Central..... | ..... | ..... | ..... | ..... | ..... | ..... | 0 |
| Mountain..... | 0.5 | ..... | ..... | 0.5 | ..... | 1 | 2 |
| Pacific..... | 3.0 | ..... | ..... | ..... | ..... | ..... | 3 |
| Europe..... | ..... | ..... | ..... | ..... | ..... | 1 | 1 |
| Total..... | 27.2 | 4.2 | 4.0 | 3.2 | 0.5 | 22 | 61 |

Table III, in addition to the totals for men and women, gives, in the last column, the number of psychologists in each geographical section for every million population (Census of 1920, preliminary

TABLE III

SUBJECT OF INSTRUCTION, 393 MEN AND WOMEN
 Number of Persons Giving Instruction in Subjects Listed

| | Psy- chology | Applied Psy- chology | Educa- tion | Philoso- phy | Miscel- laneous | No Instruc- tion | Total | Psycholo- gists per 1,000,000 Population |
|----------------------|-----------------|----------------------------|----------------|-----------------|--------------------|------------------------|-------|---|
| New England..... | 25.7 | 2.5 | 8.7 | 10.7 | 3.0 | 16 | 67 | 9.05 |
| Middle Atlantic..... | 48.7 | 15.5 | 18.0 | 18.7 | 5.0 | 22 | 128 | 5.75 |
| N. E. Central..... | 36.0 | 5.3 | 6.7 | 10.0 | 1.7 | 19 | 79 | 3.68 |
| N. W. Central..... | 22.7 | 8.7 | 4.0 | 4.0 | 0.5 | 3 | 43 | 3.43 |
| South Atlantic..... | 11.5 | 3.2 | 3.5 | 3.0 | 1.7 | 7 | 30 | 2.14 |
| S. E. Central..... | 2.0 | 0.5 | 1.5 | 1.0 | ..... | 2 | 7 | 0.79 |
| S. W. Central..... | 5.0 | 1.0 | ..... | 1.0 | ..... | 1 | 8 | 0.78 |
| Mountain..... | 5.5 | 1.5 | 0.5 | 1.5 | ..... | 2 | 11 | 3.28 |
| Pacific..... | 10.2 | 5.2 | 1.3 | 0.3 | 1.0 | ..... | 18 | 3.23 |
| Europe..... | ..... | ..... | ..... | ..... | ..... | 2 | 2 | ..... |
| Total..... | 167.7 | 43.3 | 44.5 | 50.3 | 13.2 | 74 | 393 | ..... |

report in daily press). In the continental United States, exclusive of Alaska, there are 3.70 psychologists per million population.

Tables IV-VI show fields of research reported from the geographical sections named in Tables I-III. Classification is difficult to make because of the variety of terms used. When one person reported more than one field of research, the different fields were counted equally. Thus two research interests were scored each $1/2$; three fields of research, each $1/3$; four fields, each $1/4$. It was not necessary to consider any one person as doing research in more than four different fields. The fractions are entered in the table in decimals for the sake of convenience, but the totals have been arrived at accurately by the use of exact fractions. The classes may be explicated as follows: *Philosophy*: logic, ethics, metaphysics, values, etc. *Aesthetics*: whenever the term is used. *Anthropology* includes anthropometry. *Education* includes experimental education and hygiene, but not educational tests. *Physiology and Neurology*: whenever these terms are used. *Psychiatry* includes psychoanalysis. *General Psychology* includes unqualified reports of psychology as a field of research, and a few special fields such as religious psychology, genetic psychology, analytic psychology, and synthetic psychology, which are too infrequent to be listed separately. *Abnormal Psychology* includes the definite use of this term, and all other topics that would presumably come under it (e.g., dreams, complexes) except psychiatry, psychopathology, psychoanalysis, and clinical psychology. *Psychopathology*: whenever the

TABLE V
FIELD OF RESEARCH, 61 WOMEN
Number of Women Reporting the Fields of Research Listed

| | Philosophy | Aesthetics | Education | Physiology and Neurology | Psychology | | | | | | | | | | No Research | Total |
|----------------------|------------|------------|-----------|-----------------------------|------------|----------|---------------|---------|-------|------------|----------|-------------|--------|--------------|-------------|-------|
| | | | | | General | Abnormal | Psychopathol. | Applied | Tests | Industrial | Clinical | Educational | Animal | Experimental | Theoretical | |
| New England..... | 1.0 | ... | 1.0 | ... | ... | ... | ... | ... | 2.0 | ... | 1.5 | ... | ... | 1.5 | 1.0 | 11 |
| Middle Atlantic..... | 0.5 | 1.0 | 1.3 | ... | 1.7 | ... | ... | ... | 4.0 | ... | 0.7 | 2.2 | 1.0 | 5.7 | 0.5 | 21 |
| N. E. Central..... | ... | ... | ... | ... | ... | 1.3 | ... | 0.3 | 4.0 | 0.5 | 0.5 | 1.0 | 0.5 | 1.7 | ... | 11 |
| N. W. Central..... | ... | ... | ... | ... | ... | ... | ... | ... | 2.5 | ... | ... | ... | ... | 2.0 | ... | 7 |
| South Atlantic..... | ... | ... | ... | 0.5 | ... | ... | 0.5 | ... | 1.0 | ... | ... | 0.5 | ... | 0.5 | ... | 4 |
| S. E. Central..... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | 0.5 | ... | 0.5 | ... | 1 |
| S. W. Central..... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | 0 |
| Mountain..... | ... | ... | ... | ... | ... | 1.0 | ... | ... | 0.5 | ... | ... | ... | ... | 0.5 | ... | 2 |
| Pacific..... | ... | ... | ... | ... | ... | ... | ... | ... | 0.5 | ... | 0.5 | 0.5 | ... | 1.5 | ... | 3 |
| Europe..... | ... | ... | ... | ... | ... | ... | ... | ... | 0.3 | ... | ... | 0.3 | ... | 0.3 | ... | 1 |
| Total..... | 1.5 | 1.0 | 2.3 | 0.5 | 1.7 | 2.3 | 0.5 | 0.3 | 14.7 | 0.5 | 3.3 | 5.5 | 1.5 | 14.5 | 1.5 | 61 |

TABLE VI
FIELD OF RESEARCH, 393 MEN AND WOMEN
Number of Persons Reporting the Fields of Research Listed

| | Philosophy | Aesthetics | Anthropology | Education | Psychology and Neurology | Psychiatry | Psychology | | | | | | | | | | Miscellaneous | No Research | Total | | |
|----------------------|------------|------------|--------------|-----------|-----------------------------|------------|------------|----------|---------------|---------|-------|------------|------------|----------|-------------|--------|---------------|-------------|-------|--------|--------------|
| | | | | | | | General | Abnormal | Psychopathol. | Applied | Tests | Statistics | Industrial | Clinical | Educational | Social | | | | Animal | Experimental | Theoretical |
| New England..... | 4.5 | ..... | ..... | 3.0 | 1.2 | ..... | 1.5 | 1.2 | 2.5 | 2.7 | 7.7 | ..... | 1.5 | 1.7 | 3.3 | 0.3 | 2.3 | 15.2 | 8.3 | 0.5 | 67 |
| Middle Atlantic..... | 5.5 | 1.5 | 1.3 | 5.7 | 1.5 | 2.5 | 3.3 | 1.7 | ..... | 3.6 | 16.5 | 0.5 | 3.0 | 3.7 | 12.6 | 2.6 | 2.7 | 25.5 | 13.1 | 2.0 | 128 |
| N. E. Central..... | 3.3 | 0.3 | ..... | 2.0 | 1.0 | ..... | 1.0 | 3.0 | ..... | 2.2 | 13.1 | ..... | 2.6 | 3.6 | 9.7 | 1.0 | 2.2 | 12.4 | 8.5 | 1.0 | 79 |
| N. W. Central..... | 1.0 | ..... | 0.2 | 0.5 | ..... | ..... | 2.5 | ..... | ..... | 0.5 | 7.1 | ..... | ..... | 2.0 | 8.3 | 1.3 | 1.7 | 11.5 | 2.2 | ..... | 43 |
| South Atlantic..... | 1.0 | ..... | 1.0 | 0.5 | 0.5 | ..... | 0.5 | ..... | 4.5 | ..... | 3.0 | ..... | 0.3 | 0.5 | 3.3 | ..... | 2.7 | 3.5 | 2.5 | 1.0 | 30 |
| S. E. Central..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 1.3 | 0.7 | ..... | ..... | ..... | 1.3 | ..... | 0.3 | 1.3 | ..... | ..... | 7 |
| S. W. Central..... | 0.5 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 0.5 | ..... | ..... | 0.3 | 0.7 | 0.3 | 1.0 | 4.2 | 0.3 | ..... | 8 |
| Mountain..... | ..... | ..... | ..... | 0.5 | ..... | ..... | ..... | 1.3 | ..... | ..... | 1.5 | ..... | ..... | 0.5 | 1.3 | 0.3 | 0.3 | 3.2 | 1.0 | ..... | 11 |
| Pacific..... | ..... | ..... | ..... | 1.0 | ..... | ..... | ..... | ..... | ..... | 0.2 | 3.6 | 0.2 | ..... | 1.2 | 2.5 | ..... | 2.0 | 4.0 | 1.5 | 0.5 | 18 |
| Europe..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 0.3 | 0.5 | ..... | ..... | 0.3 | ..... | ..... | 0.7 | ..... | ..... | 2 |
| Total..... | 15.7 | 1.7 | 2.6 | 13.2 | 4.2 | 2.5 | 8.7 | 7.2 | 7.0 | 10.7 | 54.2 | 1.2 | 7.4 | 13.7 | 43.9 | 6.1 | 15.5 | 81.6 | 37.4 | 5.0 | 393 |

term is used. *Applied Psychology* includes all applications not listed elsewhere (e.g., advertising). *Tests* includes mental tests, educational tests, industrial tests, and a few mentions of individual psychology. *Statistics* includes a few cases of mental measurement and one case of psychophysics. *Industrial Psychology* includes personnel, but not industrial tests. *Clinical Psychology* includes feeble-mindedness and delinquency, but not intelligence tests. *Educational Psychology* includes a few cases of child psychology which were not numerous enough for separate mention. *Social Psychology* includes racial psychology. *Animal Psychology* includes animal behavior and comparative psychology; the term comparative psychology seems to be used in the Year Book only for infra-human material. *Experimental Psychology* is usually reported as such, but special experimental interests (e.g., optics, affection) are included under it. *Theoretical Psychology* includes systematic psychology and the history of psychology. All other fields of research are listed under *Miscellaneous*. *No Research* means that there is no report of any research interest.

TABLE VII

ACADEMIC RANK, 393 MEN AND WOMEN
Number of Persons in Various Classes of Academic Status

| | Presi- dents | Profes- sors | Assoc. and Asst. Profes- sors | Instruc- tors and Assist- ants | Other Collegi- ate Status | Non-col- legiate Academic Status | Non- academic Status | Profes- sional Status Not Given | Total |
|---------------|-----------------|-----------------|--|---|------------------------------------|---|----------------------------|--|-------|
| Men | 12 | 162 | 60 | 28 | 1 | 13 | 40 | 16 | 332 |
| Women . . . | 0 | 11 | 6 | 14 | 2 | 4 | 12 | 12 | 61 |
| Total . . . | 12 | 173 | 66 | 42 | 3 | 17 | 52 | 28 | 393 |

Table VII gives the academic status of men and women. The geographical subdivision of this table seems to add no data of interest and is not given. As *Presidents* are listed university and college presidents. *Associate and Assistant Professors* include also adjunct professors. *Instructors and Assistants* include also lecturers, associates, research associates, and research assistants. All other persons having definite status in a university or college are listed under *Other Collegiate Status*. Persons engaged in teaching in high schools, normal schools, or other institutions not universities or colleges, are recorded as of *Non-collegiate Academic Status*. Other persons are of *Non-academic Status* or do not report their profes-

sional status. The Secretary has been unable to resolve the inconsistency that appears when persons reporting no teaching status nevertheless return a subject of instruction.

TABLE VIII
ACADEMIC DEGREES, 393 MEN AND WOMEN
Number of Persons Holding Each Degree

| Degree | Men | Women | Total | Degree | Men | Women | Total |
|-------------|-----|-------|-------|-------------|-----|-------|-------|
| Ph.D..... | 290 | 55 | 345 | Ph.M..... | 3 | 0 | 3 |
| A.B..... | 231 | 42 | 273 | B.L..... | 2 | 0 | 2 |
| A.M..... | 182 | 26 | 208 | D.D..... | 2 | 0 | 2 |
| B.S..... | 35 | 6 | 41 | M.E..... | 2 | 0 | 2 |
| LL.D..... | 29 | 3 | 32 | Pd.D..... | 2 | 0 | 2 |
| M.D..... | 28 | 1 | 29 | B.Ed..... | 0 | 1 | 1 |
| Ph.B..... | 16 | 4 | 20 | Ch.B..... | 1 | 0 | 1 |
| M.S..... | 13 | 1 | 14 | D.C.L..... | 1 | 0 | 1 |
| B.D..... | 13 | 0 | 13 | Litt.B..... | 1 | 0 | 1 |
| D.Sc..... | 10 | 2 | 12 | M.Di..... | 1 | 0 | 1 |
| Litt.D..... | 3 | 1 | 4 | M.C..... | 1 | 0 | 1 |
| L.C.B..... | 4 | 0 | 4 | M.L.A..... | 1 | 0 | 1 |
| L.H.D..... | 3 | 0 | 3 | M.S.D..... | 1 | 0 | 1 |
| Litt.B..... | 3 | 0 | 3 | Pe.B..... | 1 | 0 | 1 |
| Pd.M..... | 3 | 0 | 3 | | | | |

Table VIII gives the number of persons holding various academic degrees. When the same degree has been conferred more than once on the same person, only a single instance is counted. There are no cases in which the Ph.D. has been conferred more than once on the same person. The A.B., the A.M., the D.Sc., and the D.D. have sometimes been conferred twice. The LL.D. has been conferred twice on eight persons, three times on three persons, and four times on two persons. All degrees have been kept separate in the table except that B.A. has been listed with A.B., M.A. with A.M., Sc.D. with D.Sc., S.B. and B.Sc. with B.S., B.Litt. with Litt.B., and D.Phil. with Ph.D.

TABLE IX
DATE OF PH.D.
299 Degrees of which Date is Recorded

| 1875-1879 | 1880-1884 | 1885-1889 | 1890-1894 | 1895-1899 | 1900-1904 | 1905-1910 | 1911-1914 | 1915-1919 |
|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| 1 | 1 | 3 | 19 | 37 | 38 | 61 | 69 | 70 |

Table IX gives the date of the conferring of the Ph.D., which is the most representative professional degree for psychologists. The date of conferring is reported in only 299 cases of the 345 Ph.D.'s reported. One Ph.D. in 1920 is omitted.

BOOKS RECEIVED

- GRUENDER, H. *Experimental Psychology*. Chicago: Loyola Univ. Press, 1920. Pp. 295. \$1.50.
- CORIAT, I. H. *The Hysteria of Lady Macbeth*. New York: Moffat, Yard and Co., 1912. Pp. 94.
- COEN, AUGUSTO MARIO. *L'Estetica Sperimentale*. Roma: Maglione and Strini, 1920. Pp. 63.
- Revista de Educacion Nacional*. Santiago de Chile: Asociacion de Educacion Nacional, 1920. Vol. XVI, Nos. 1 and 2.
- GENTILE GIOVANNI. *Discorsi de Religione*. Firenze: Vallecchi, 1920. Pp. 136.
- ANGELL, J. R. *The Development of Research in the United States. Reprint and Circular Series of the National Research Council*, No. 6. Pp. 19.
- University of Buffalo Studies*, Vol. 1, No. 2. June, 1920.
- Bull. of the Mass. Commission on Mental Diseases*, July, 1919.
- WHEELER, R. H. *The Synaesthesia of a Blind Subject*. *Univ. of Ore. Publs.* Vol. 1, No. 5. May, 1920. Pp. 61.
- WALLIN, J. E. W. *Psycho-Educational Clinic and Special Schools. Report of the Superintendent of Instruction, St. Louis, Mo. Public Schools, 1918-1919*. Pp. 68-121.

NOTES AND NEWS

DR. JAMES H. HYSLOP died on June 17th, at the age of 66 years. For some years Dr. Hyslop has been director and secretary of the American Society for Psychical Research. He has been professor of philosophy, ethics and psychology successively at Smith College, Bucknell University and Columbia University.

DR. ETHEL BOWMAN has been made Associate Professor of Psychology at Goucher College.

DR. GILBERT J. RICH has left Drake University to accept an instructorship in psychology at the University of Pittsburgh.

DR. HORACE B. ENGLISH has been made assistant professor of psychology at Wellesley College.

DR. MARTIN L. REYMERT has left the University of Iowa to return to Norway.

WE are pleased to announce the appearance of a new Italian journal for psychology, *Archivio Italiano di Psicologia*, edited by Professors F. Kiesow and A. Gemelli, with Professors V. Benuzzi, L. Botti, C. Colucci, S. de Sanctis, E. Morselli, and M. Ponzo as collaborators. The *Archivio* is published from the Institute of Experimental Psychology, of the University of Turin, and the subscription price is L. 40.

THE following items have been taken from the Press:

DR. BUFORD J. JOHNSON has been appointed associate professor of psychology at Johns Hopkins University.

PROFESSOR C. LLOYD MORGAN has resigned as vice-chancellor of Bristol University and has been appointed emeritus professor of psychology and ethics.

DR. DANIEL STARCH, of the University of Wisconsin, has become associate professor of psychology in the school of business administration at Harvard University.

DR. JOHN T. METCALF, psychological examiner with the Illinois Department of Public Welfare, has been appointed assistant professor of psychology in George Washington University.

